

DISTRIBUTION AND COLD HARDINESS OF *CHYMOMYZA*
COSTATA (ABSTRACT)

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Chymomyza costata is a holarctic dipteran species distributed from northern Japan to the Arctic Circle. It is known from Inuvik in the Northwest Territories of Canada, Verkhoyansk in eastern Siberia, Ivalo in Lapland, Hallormstadur in Iceland, etc. In summer, adult flies are found around fresh stumps and fallen trees. The fertilized females lay eggs on the cut ends of fallen trees. The larvae feed on fungi growing under the bark. When they grow with short days and cool temperatures, they enter diapause at the final instar stage to provide for winter. Probably reflecting the severe climate of the habitats, the diapausing larvae exhibit remarkable cold hardiness. In optimum acclimation and cooling conditions, they survive freezing at -100°C . Cold acclimation, inoculative freezing and slow cooling are essential factors for the expression of their potent freeze tolerance. The diapausing larvae of some congeneric species, *C. distincta*, *C. fuscimana* and *C. aldrichii*, are also tolerant to freezing. The difference in freeze tolerance among these species seems to be partly related to their distribution.

Although *Chymomyza* flies cannot extend their distribution to the Arctic tundra due to their tree-dependent life cycles, their adaptation mechanisms to cold climates seem to provide useful information for understanding life in the polar regions.

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